

Building Trust Through Visibility: SETUP Refund Monitoring System

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1. INTRODUCTION

1.1 Background/Rationale

The Department of Science and Technology (DOST) plays a crucial role in fostering innovation, scientific research, and technological advancement in the Philippines. DOST as the leading enabler and provider of science, technology, and innovation (STI) explicit solutions towards national development.[1].

Under the leadership of Provincial S&T Director Bernardo T. Caringal, DOST PSTC-Marinduque has focused on maximizing economic and social benefits for the local community through its strategic initiatives and programs[2]. Notably, the Small Enterprise Technology Upgrading Program (SETUP) has been a key project, empowering local businesses to enhance their productivity and competitiveness through the adoption of innovative technologies[3].

However, the organization still encounters problems in data management. In terms of profiling, the MSMEs do not have access to their accounts and are unable to view their refund status or summary of refunds, raising concerns about the transparency of the SETUP. The administrators are also experiencing redundant data records in the system, leading to inefficiencies in data management, and difficulties in maintaining data integrity. In terms of monitoring, the stakeholders under the SETUP project face challenges in monitoring the status of their refunds,

including delays, restructuring, graduation, and advancements. This lack of clear and timely information causes frustration and limits financial planning. Additionally, manual computation of refunds in the SETUP project is time-consuming and prone to errors, leading to delays and inaccuracies that negatively impact the efficiency and reliability of the refund process.

With the problem mentioned above, the developer proposed a web-based system entitled “**SETUP Refund Monitoring System**”. The proposed system will help the organization by providing MSMEs with access to their accounts to view refund statuses and summaries, enhancing transparency and financial planning. It will also address data management issues by eliminating redundant records and ensuring data integrity. The system will offer real-time updates on refunds, reducing delays and frustrations, and automate refund computations to improve accuracy and efficiency. Overall, this system aims to enhance operational efficiency, transparency, and reliability in refund management within DOST-PSTO Marinduque.

1.2 Project Objectives

The project aims to develop a system that will monitor the clients’ refund status and project information in the SETUP project. Specifically, this aims to:

1. Study and analyze the existing

- system.
2. Analyze the system feasibility in terms of operational, technical and economic feasibility.
 3. Design and Develop a SETUP Refund Monitoring System
 4. Test the functionality and evaluate the system.
 5. Implement the system.

1.3 Significance of the Project

The proposed system would benefit the following:

- To the **DOST-PSTO Marinduque** - The system will automate refund monitoring in the SETUP project reducing the administrative burden and improving overall compliance.
- To the **MSMEs** - The system will benefit the MSMEs by easily providing transparency of their refund status.
- To the **project team** - The system will be a significant endeavor for the project team by enhancing their technical skills and professional development while enabling them to contribute to positive social and economic impacts through innovative and effective system implementation.
- To the **future researchers** - The system will benefit future researchers by serving as a case study for successful IT project implementation in the public sector, offering insights into automating administrative processes and improving transparency and efficiency in government programs.

1.4 Project Scope

The project involves several processes such as System Planning, Requirement Analysis, Design, Coding, Testing and Deployment.

Under system planning, defining clear goals, identifying stakeholders, and developing a roadmap is conducted to achieve project objectives. It ensures alignment with stakeholder expectations and outlines the

boundaries and deliverables of the project, ensuring clarity and focus throughout its execution.

Through requirement analysis, prioritizing and validating gathered requirements is executed to clearly define the project scope, ensuring it aligns with stakeholder expectations and project success criteria.

In system design, it involves developing a comprehensive system design that includes architectural and UI/UX designs. It also includes iterating on design documents based on feedback to ensure alignment with stakeholder requirements and expectations throughout the project lifecycle.

During the coding phase, establishing a development environment, implementing necessary features, and conducting code reviews is conducted to ensure quality and adherence to requirements.

While the testing phase involves implementing unit testing, integration testing, and user acceptance testing to verify software functionality and ensure it meets stakeholder requirements and quality standards.

The scope of the project encompasses the development and implementation of the SETUP Refund Monitoring System developed specifically for the Department of Science and Technology (DOST) - Provincial Science and Technology Office (PSTO) in Marinduque. The project serves three primary user roles: administrators (PSTO staff managing refund processes), clients (businesses under DOST-PSTO Marinduque submitting refund requests), and system administrators (managing system maintenance, security, and user roles).

The system is limited to monitoring the refund project and their refund status while providing reports to the clients. It does not handle other financial transactions, process refunds, or manage other aspects of the SETUP program beyond tracking and reporting refund statuses. While the system enhances transparency and efficiency in monitoring refunds, it relies on accurate and timely data input from users and administrators. Any delays or inaccuracies in data entry can affect

its effectiveness. This limitation underscores the need for ongoing training and quality control measures to ensure data integrity and reliability. Despite these limitations, the system will significantly improve the current processes by automating and streamlining refund status monitoring, thereby benefiting all stakeholders involved.

1.5. Definition of Terms

Operational Definition:

1. Refund - the liquidation of the technical assistance of the SETUP project.
2. MSMEs - Micro, small and medium enterprises affiliated in the DOST SETUP project.

II. Review of Related Literature

2.1 DOST PSTO-Marinduque

The DOST PSTO-Marinduque, under the leadership of Provincial Science and Technology Director Bernardo T. Caringal, is a hub for innovation and technological advancement in the region. Located at the PSTO Building within the PEO(Professional Employer Organization) Capitol Compound in Bangbanganon, Boac, Marinduque, this center plays a crucial role in fostering scientific research and development. The facility is dedicated to supporting local industries and communities by providing access to the latest scientific knowledge and technological resources. Director Bernardo T. Caringal's commitment to excellence ensures that the center remains at the forefront of promoting sustainable development and enhancing the quality of life for the residents of Marinduque[4].

The office has initiated various projects that have positively impacted the local economy and improved the lives of residents. One notable achievement is the development and promotion of "New-to-the-World Products," including vacuum-fried dilis, malunggay crackers, and coconut candy.

These innovative products were created through a collaboration with the local government of Mogpog and funded by the Bottom-up Budgeting (BUB) program[5].

Additionally, the center has been instrumental in supporting local micro, small, and medium enterprises (MSMEs) through programs like SETUP (Small Enterprise Technology Upgrading Program). For instance, the PSTOs assistance to 3 Sisters' Homemade Banana Chips included providing technology upgrades, improving packaging, and ensuring compliance with good manufacturing practices. This support significantly boosted their production capacity and market reach, transforming a small family business into a prominent local enterprise recognized as one of Marinduque's best pasalubong (souvenir) producers[6].

These accomplishments demonstrate DOST PSTO-Marinduque's dedication to utilizing science and technology for regional development and enhancing the socio-economic well-being of the local population.

2.2 Small Business

Marinduque's businesses, which range from traditional handicrafts and food production to hospitality, play a crucial role in the local economy. However, these enterprises often face challenges that require support from DOST-PSTO Marinduque. Technological upgrades are vital for many small-scale producers to enhance efficiency and product quality. Programs like SETUP have already helped businesses such as 3 Sisters' Homemade Banana Chips improve their production processes and packaging, demonstrating the transformative impact of modern technology[7].

Training and capacity building are also essential for local entrepreneurs to maintain high standards and expand their market reach. Continuous education on best practices, including food safety, good manufacturing practices, and entrepreneurial skills, can significantly benefit businesses. Workshops

and seminars provided by DOST-PSTO Marinduque equip local producers with the knowledge needed to stay competitive and adhere to industry standards[8].

Furthermore, access to funding and quality assurance certifications is crucial for the growth and sustainability of these businesses. Financial assistance enables businesses to invest in new equipment and improve their facilities, while certifications like FDA approval increase consumer trust and open new market opportunities. DOST-PSTO Marinduque's support in research and development fosters innovation, helping businesses create new products and improve existing ones, ensuring they remain competitive in broader markets[9].

2.3 SETUP

The Small Enterprise Technology Upgrading Program (SETUP) is a flagship program and nationwide strategy of DOST specifically focused on providing technical assistance to MSMEs(Micro, small and medium enterprises) to enhance their productivity and competitiveness. SETUP prioritizes various sectors including food processing, agriculture, poultry, livestock, forestry, marine products, metals, and fabrication. Also, construction-related products, gifts, decors, handicrafts, wearables, furniture, health and wellness, and creative industries. Initially, SETUP conducts a Technology Needs Assessment to determine the appropriate technology for each business. To complement this, the program offers technical training and consultancies to ensure that MSMEs have the necessary skills to utilize the acquired technology. Furthermore, the program extends its support to regulatory compliance by providing assistance to businesses in meeting the required standards and regulations. MSMEs qualified for SETUP significantly to achieve long-term organizational success and stakeholder satisfaction[13].

are Filipino-owned entities with a capitalization of P100 million and below, operating within priority sectors for at least three years and maintaining a commendable track record[10].

2.5 Definition and Characteristics of Refund Monitoring Systems

Refund Monitoring Systems are technological solutions that enable businesses to oversee and manage the process of issuing refunds to customers. These systems ensure that refunds are processed accurately, efficiently, and in compliance with company policies and relevant regulations. This is a tool that tracks and evaluates refund processes within businesses[11].

Financial monitoring, including internal and state systems, plays a crucial role in ensuring financial security and preventing risks. Internal financial monitoring systems are essential for evaluating the effectiveness of green financing projects and promoting sustainable development goals. Effective financial monitoring systems are crucial for ensuring the security of funds and mitigating risks. They play a vital role in evaluating the success of green financing projects and advancing sustainable development goals through rigorous internal and state oversight[12].

Monitoring systems, whether financial or quality-related, are essential for evaluating performance, setting goals, and addressing discrepancies to improve overall efficiency and effectiveness. Such systems not only provide a means to track financial health or product quality but also empower organizations to identify areas for improvement and optimize resource allocation. By fostering a culture of continuous improvement and accountability, these monitoring systems contribute

2.4 Case Studies of Refund Monitoring Systems in Similar Context

To enrich the development process and ensure the efficacy of the proposed refund

monitoring system, this category draws upon a series of relevant case studies. These studies provide a practical foundation by detailing real-world implementations of similar systems. Through a thorough analysis of these case studies, key insights can be gleaned regarding the challenges and triumphs encountered in prior projects. This acquired knowledge can be directly applied to the development of the SETUP refund monitoring system, ultimately contributing to the design of a robust and efficient solution.

The refund monitoring systems play an important role in various contexts, ensuring financial transparency and efficient management. This section of our study review delves into case studies of refund monitoring systems implemented in situations similar to ours. By analyzing these real-world examples, we aim to gain valuable insights into the functionalities, effectiveness, and potential challenges associated with such systems.

The first case study we explore focuses on a refund module developed for a student financial information system. The study emphasizes system verification and validation, prioritizing the thorough testing and confirmation of all refund-related functions. It focuses on robust verification and validation aims to enhance the reliability and trustworthiness of the system when handling student financial transactions. This connection ensures that the module aligns with the specific requirements and functionalities outlined by DOST SETUP, focusing on meticulous verification and validation to meet regulatory and operational standards[14]. Financial transactions through a manual system of operation are prone to errors and unimagined complexities, making it a difficult task maintaining all entries of users' accounts, search records of activities, handle loan deduction errors and generate reports. International Institute of Science, Technology Research and Development (IISTRD) developed a dynamic system that will effectively manage the loan scheme of a

named organization. The system essentially manages both short-term and long-term loans, and keeps track of cash inflow and outflow of a cooperative society among others. It utilized SQL Server database architecture at the back end and Visual Basic.Net framework at the front end. This makes it user-friendly and highly interactive. A pragmatic system bundles with several competent capabilities to eliminate data inconsistency and redundancy as well as ensuring data integrity and security, with guaranteed fast retrieval response time [12]. Given these capabilities, this system can serve as a valuable reference for the development of the SETUP refund monitoring system. The established system's success in managing loans and financial records effectively can guide the implementation of similar features in the SETUP system, ensuring robust handling of refunds and financial transactions and records[15].

Additionally, the development of client based front-end that will allow the firms to access their individual summary of refunds is also crucial. A case study of Kitgum Co-operative Savings and Credit Society LTD; Automation of client database loan management system for cooperative society used to store, update and help in follow up of clients who are on Loan program at Kitgum Cooperative Savings and Credit Society in Loan department and store confidential information on them. This will also cater for the newly accepted client under the department. It's in due course because of the problems incurred due to storage of data in a paper system like; data loss, misplacement, and disclosure of the confidential data to unauthorized retrieval, and others. It therefore calls for a security for the data by design for a computerized database system and will generate reports for the staff[16].

Lastly, the case study of Ishaka farmers sacco limited loan management information system. The Loan Management

Information System is a computerized database of financial information organized and programmed in such a way that it produces regular reports on operations for every level of management in a SACCO; it is usually also possible to obtain special reports from the system easily. The loan management information system developed authenticates System users and enables them to capture and store loan records and client banking records, the system allows the users to view loan reports and Client payment records, also the system calculates payment denominations for loans. The loan management information system reduces a burden of over compiling of papers and the need for more shelves which reduce congestion in their organization[17].

In conclusion, by drawing upon the insights gleaned from the review of related literature, particularly the successful implementation of similar systems such as the Loan Management Information System, the development of the SETUP Refund Monitoring System becomes not only feasible but also promising in terms of delivering tangible benefits to the organization. These findings underscore the importance of leveraging existing knowledge and best practices to inform the design and implementation of innovative solutions.

2.6 Key Components and Features of Effective Refund Monitoring Systems

The key components and features of effective refund monitoring systems include a focus on minimizing cost and time, maintaining effective stock, and optimizing performance measures[18]. The emphasis on minimizing costs and time within refund monitoring systems underscores their efficiency and economic viability. Additionally, optimizing performance measures ensures that resources are utilized optimally, leading to enhanced operational outcomes and stakeholder confidence in the system's reliability.

Deposit-refund systems, a key aspect of these monitoring systems, have been found to be effective in increasing recycling rates, particularly in cases where current rates are low[19]. Deposit-refund systems offer a compelling incentive structure that aligns economic benefits with environmental stewardship. By encouraging higher recycling rates through tangible rewards, these systems not only mitigate waste but also cultivate a culture of responsible consumption, contributing positively to sustainability goals on both local and global scales.

However, the implementation of these systems should be designed to be revenue neutral to ensure political acceptability[20]. Maintaining revenue neutrality in the implementation of deposit-refund systems is crucial for garnering political support and sustaining long-term effectiveness. It ensures fairness and minimizes economic burden on consumers and businesses, thereby fostering continued participation and compliance with recycling initiatives.

Technology-enabled countermeasures, such as customer profiling and product tracking, can also play a crucial role in managing consumer returns and mitigating return abuse[21]. Optimizing technology for customer profiling and product tracking represents a proactive approach to address challenges associated with return abuse. By enhancing transparency and accountability in return processes, these technological solutions not only protect businesses from financial losses but also foster trust and satisfaction among consumers by ensuring fair and efficient handling of returns.

2.7 Relevance and Benefits of Refund Monitoring Systems in SETUP Projects

The proposed Refund Monitoring System for the SETUP project of DOST can significantly enhance operational efficiency and customer satisfaction. By utilizing

specialized monitors to track customer transactions and apply credits in real-time, the system enables seamless refund processes and promotes loyalty through credit utilization at partner brands[22]. The integration of a Refund Monitoring System tailored for the SETUP project exemplifies forward-thinking in enhancing service delivery and stakeholder engagement. By prioritizing efficiency and customer-centric solutions, this initiative not only streamlines operations but also strengthens the project's impact by fostering trust and satisfaction among participants and stakeholders alike.

Refund monitoring plays a crucial role in ensuring accountability in SETUP projects of DOST. By emphasizing the accountability of projects to beneficiaries and fostering project ownership through community-based organizations[23], monitoring mechanisms can address the timely and quality delivery of project outcomes, preventing failures due to dysfunctional monitoring systems[24]. Emphasizing accountability through refund monitoring in SETUP projects is essential for building trust and transparency with beneficiaries. Additionally, fostering project ownership via community-based organizations not only empowers local stakeholders but also enhances the sustainability and effectiveness of these initiatives.

Furthermore, monitoring the contribution of development teams to technical debt accumulation in software projects can enhance success rates and productivity, showcasing the importance of monitoring in various project types[25]. Monitoring technical debt in software projects is a vital practice that can significantly boost success rates and productivity by ensuring long-term maintainability and quality. Similarly, in SETUP projects, vigilant monitoring of various aspects, including financial and operational metrics, can lead to better project outcomes, demonstrating the universal value of robust monitoring systems across different

project types.

2.8 Alignment with DOST's Goals and Objectives

The Department of Science and Technology (DOST) pursues a comprehensive set of goals and objectives, reflecting its deep-seated commitment to advancing society through science and technology. By fostering scientific and technological capabilities, DOST empowers both individuals and institutions, cultivating a culture of exploration and innovation. Through expedited technology transfer and commercialization, it ensures that the benefits of research swiftly reach the public, amplifying the impact of scientific endeavors. Strengthening science and technology infrastructure provides a solid foundation for sustained progress, enabling future breakthroughs to flourish. DOST also recognizes the importance of nurturing a pervasive culture of scientific inquiry, fostering curiosity and ingenuity across communities. Additionally, by promoting international cooperation, DOST contributes to a global network of knowledge exchange, accelerating progress on a global scale. In essence, DOST's multifaceted approach underscores its dedication to driving societal advancement through the transformative power of science and technology[26].

The Refund Monitoring System will prioritize enhancing accountability, transparency, and efficiency in fund utilization while promoting innovation, economic development, stakeholder empowerment, compliance, and data-driven decision-making. By providing transparent tracking of fund allocation and utilization, incorporating innovative technologies, ensuring timely refunds for eligible activities, empowering stakeholders with real-time information, ensuring compliance with regulations, and facilitating data analysis for evidence-based decision-making, the refund monitoring system can effectively support DOST's mission to foster

technological advancement, stimulate economic growth, and promote socio-economic progress through science and technology interventions.

2.9 Recap of Key Points Discussed in the Literature Review

The discussion encompasses the vital role of the Department of Science and Technology (DOST) in spearheading scientific and technological advancements for national development. It outlines the significance of small businesses in economic growth and the challenges they face, along with DOST's SETUP program aimed at enhancing MSMEs' productivity. The importance of refund monitoring systems in ensuring financial security, risk prevention, and quality management is emphasized, particularly in the context of DOST's projects. These systems streamline operations, improve customer experience, and uphold accountability. The alignment of refund monitoring systems with DOST's overarching goals underscores their contribution to fostering innovation, economic development, stakeholder empowerment, and compliance through science and technology interventions.

In the current literature, there is a notable absence of specific research focusing on the integration of refund monitoring systems within development programs such as the Small Enterprise Technology Upgrading Program (SETUP) facilitated by the Department of Science and Technology (DOST). While existing studies extensively discuss refund monitoring in commercial contexts and consumer behavior, there is a clear gap in understanding how such systems can bolster accountability and efficiency in government-led initiatives aimed at bolstering small and medium-sized enterprises (MSMEs).

2.10 Connection Between Existing Literature and the Proposed Research

The proposed research on the SETUP Refund Monitoring System integrates

seamlessly with existing literature, leveraging foundational concepts, empirical evidence, and practical insights to advance knowledge in the field of refund monitoring systems. Drawing upon a conceptual framework established by previous studies, the research acknowledges the importance of efficiently tracking and managing refunds, while also considering the complexities of implementation across diverse contexts. Teridi (2023) developed a refund module for a student financial system, emphasizing rigorous verification and validation processes[14]. This approach aligns with the objectives of the proposed refund monitoring system for the DOST SETUP project, indicating potential synergies in implementing effective validation protocols to ensure accurate and reliable refund management within the project's framework. The study of Inderst explored the strategic use of refunds by firms, demonstrating how varying refund policies can influence consumer perceptions of quality and competitiveness[15]. This insight offers valuable considerations for the design of the refund monitoring system within the DOST SETUP project, suggesting potential strategies to ensure equitable and effective management of refunds that align with market dynamics and consumer expectations.

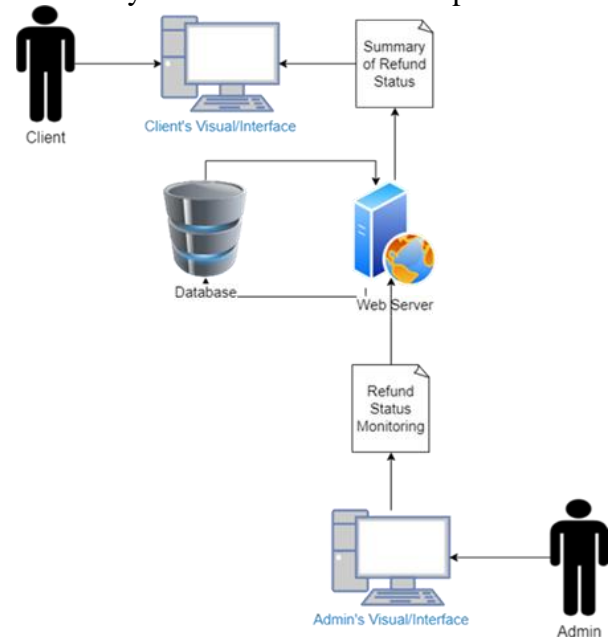


Figure 1: *System Architecture*

The review of related literature and research studies will highlight the importance of thorough testing and confirmation procedures, as shown in past case studies these studies will emphasize the need for reliable refund monitoring systems, aligning directly with the SETUP Refund Monitoring System's goals. Insights from refund management systems in cooperative societies offer practical guidance, emphasizing user-friendly interfaces and data security. Furthermore, discussions highlight the role of refund monitoring systems in ensuring accountability and efficiency in fund utilization, aligning with DOST's mission. By drawing on these insights, the SETUP Refund Monitoring System can integrate best practices and optimize functionality to support DOST's goals effectively.

III. Methodology

3.1 Requirement Analysis Procedures

In developing the system, Agile Methodology was employed to ensure flexibility, adaptability, and continuous improvement throughout the project lifecycle. This allows the team to quickly respond to changes in regulatory requirements, user feedback, and technological advancements. Iterative sprints ensure that the most critical features are developed first and refined through continuous user feedback. This helps in delivering a robust and user-friendly monitoring system that meets the specific needs of stakeholders.

To gather the necessary information, preliminary investigation was conducted using different fact-finding techniques such as interviews, observations, research and document review. Identifying stakeholders and gathering requirements is crucial to ensure the project aligns with stakeholder needs and expectations.

Initial interviews and document review were conducted to gain an

understanding of the ongoing processes within the organization and assess its capability to adapt to the project. A Letter of Interview (*Appendix A*) was handed in first to formally communicate the intention of the project and seek stakeholder cooperation.

To complement the information gathered from interviews and document reviews, a Questionnaire thru Google Form (*Appendix B*) was utilized to collect additional data from stakeholders. This approach was particularly effective for gathering a broad range of insights regarding the existing processes of the Department of Science and Technology (DOST) and the problems they encounter.

A Work Breakdown Structure (WBS) (*Appendix C*) is also used to define the project's scope, tasks, and deliverables. It aids in resource allocation, cost estimation, and risk management by providing a clear outline of the work required. To ensure a structured and timely development process, a Gantt chart (*Appendix D*) was created to measure the timeframe of the development and stages of the project. This chart serves as a visual timeline, helping to track progress and ensure that each phase of the project is completed on schedule.

Lastly, a comprehensive literature review is conducted to build a foundation of existing knowledge relevant to the project's scope. This involves identifying key databases, selecting appropriate search terms, and reviewing scholarly articles, books, and other reliable sources.

3.2 Feasibility Analysis Procedure

Feasibility analysis is conducted through a series of interviews and observations. Various research efforts related to the proposed system are undertaken to understand the involved processes. This analysis helps determine whether the proposed project is feasible.

In addition to interviews and observations, a thorough document review process has been conducted to analyze existing documentation relevant to the

proposed system. By examining reports, manuals, existing data and previous research related to the organization and involving stakeholders and experts in conversations provides valuable insights and enhances the project feasibility.

Operational feasibility is assessed through a SWOT analysis of the organization (*Appendix E*). This analysis enables proponents to identify the organization's strengths and weaknesses concerning its ability to adapt to the changes that the system may introduce.

Prototype (*Appendix F*) is used as a guide in designing the system to be able to define the user's requirements and to show the user-friendly interface for operational feasibility. In designing the prototype, tools such as Bootstrap Studio and Visual Studio Code will be employed. Through these tools, the user interface (UI) and user experience (UX) aspects of the system can be meticulously crafted to ensure ease of use and intuitive navigation.

Moreover, Technical Feasibility using GAP Analysis of Hardware and Software (*Appendix G*) is evaluated to ascertain the adequacy of the organization's ICT resources. This assessment aims to identify the system requirements necessary for the proposed project, including hardware and software needs.

Economic feasibility is conducted using Cost Benefit Analysis which assesses the costs and supplies associated with the existing system (*Appendix H*). The total amount is calculated to demonstrate the organization's consumption of materials and supplies. After breaking down the supplies and materials, the operational cost follows.

3.3 Development and Testing Procedure

Upon a series of interviews, observations, and document reviews used in gathering information, the features and functionalities of the system were proposed.

Data flow diagrams or use cases (*Appendix I, J*) will be used to illustrate the current processes within the organization and

flow of the proposed system. These diagrams aim to provide a clear picture of the organizational processes and the expected functionalities of the system.

User story(*Appendix K*) is also provided to capture user needs and desired functionalities that will guide the development process. User stories help ensure that the final product delivers real value to its users.

The system will be developed using Visual Studio Code (VS Code) as the integrated development environment (IDE). For front-end development, ReactJs will be used for structuring web pages, CSS for styling and visual design consistency, and JavaScript for dynamic and interactive user interfaces. On the back end, NodeJs will handle server-side scripting, data processing, and server communication. MongoDB will be employed for database management, storing essential data such as user information and configurations. Upon completing the development phase, User Acceptance Testing (UAT) will be conducted with real users to ensure the system functions correctly and meets specified requirements, identifying and resolving any issues before the final deployment.

3.4 Implementation Plan

After the development, the completed system will undergo initial deployment within the organization. Training sessions and seminars will be conducted to familiarize users with the system and ensure effective utilization. After the development, the completed system will undergo initial deployment within the organization. A phased approach will be implemented, where a pilot group of users will be trained on the system first. This will allow for gathering feedback and refining the system before a full organization-wide rollout. Data from the existing system will be migrated to the new system following a predefined migration plan. To ensure a smooth transition, a comprehensive change management plan will be implemented. This plan will include

communication workshops, user manuals, and a dedicated support team to address user concerns.

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APPENDICES

APPENDIX A

(Letter of Interview)



Republic of the Philippines
MARINDUQUE STATE COLLEGE
COLLEGE OF INFORMATION AND COMPUTING SCIENCES
Panfilo M. Manguera Sr. Rd., Tanza, Boac, Marinduque
CICS Tel. No.: (042) 704-0193 CICS E-mail Address: cics.msc@gmail.com
Website: www.mscmarinduque.edu.ph



April 16, 2024

Bernardo T. Caringal
Provincial S&T Director
DOST PSTO-Marinduque
PSTO Building, PEO Capitol Compound, Bangbangalon, Boac, Marinduque

Dear Sir Caringal,

Good Day!

The undersigned are students of Marinduque State College – College of Information and Computing Sciences taking up Bachelor of Science in Information Technology. Currently, we are enrolled in the course Capstone Project 1 which primary requirement is to develop a project proposal that focuses on the underlying principles of the said course with the implementation of standard operating procedures of managing organizational data, effective inventory and monitoring, analysis and prediction, and processes related to organization's current approach to delayed refund and refund rate monitoring.

As of now, we are conceptualizing the project entitled “**SETUP Refund Monitoring System**” basically for DOST PSTO-Marinduque.

The outcome of this endeavor aims to provide solutions to whatever identified problems of your organization in the area of data storage, processing and retrieval or provide opportunities to create innovations and improve business operations. But most importantly, we would like to come up with a project that will support your organization's mission, vision and core business goal.

In this regards, may we earnestly ask your permission to please allow us to make your organization the subject of this undertaking and be able to do the following activities:

1. Conduct data-gathering activities like interview and observation with regards to the day-to-day business transaction your organization delivers;
2. Ask background information about the organization and its business goals and objectives;
3. Take pictures of the business setup and physical establishment; and
4. Conduct meetings via Google Meet or Zoom for consultation purposes, if necessary.

Rest assured that whatever information we will gather will only be used in this study. We are hoping for the best that the outcome can be utilized and be of help to your organization.

Thank you very much for your most precious time and support.

Respectfully yours,

Jezreel D.S. Noche
Darwin R. Melaya
Gilbert O. Ricamara
Renna Mae G. Regio
Students

Signature:

Bernardo T. Caringal
Provincial S&T Director

Keith Paolo A. Buenaventura
Supervising Science Research Specialist

Noted by:

Doreena Joy Borja, MIT
Adviser

School Goals: The School of Information and Computing Sciences aims to produce competitive IT professionals and IT enabled individuals who will encourage real innovation for the advancement in the digital era of the province and the country as a whole.

APPENDIX B

Questionnaire

I. APPLICATION PROCESS

1. What type of enterprises are typically eligible to apply for the SETUP?

2. What are some of the common reasons for applications to be accepted?

3. What are some of the common reasons for applications to be rejected?

4. Who are the key stakeholders involved in making the final decisions?

II. UNDERSTANDING THE CURRENT MANUAL PROCESS

1. Can you describe the current processes in SETUP? (List the step by step/outline process from checking the requirements of application to refund monitoring.)

2. Who is responsible for managing and overseeing the refund process?

3. How long does it typically take to process a refund from start to finish?

III. Identifying Challenges and Pain Points

1. What are the biggest challenges you face with the current manual refund monitoring process?

2. Can you provide examples of common errors or issues that arise in the manual refund process?

3. How do you handle discrepancies or errors in the refund process?

IV. Assessing the Need for Automation

1. Why do you believe an automated refund monitoring system is necessary for the SETUP project?

2. Aside from the automation of the SETUP refund monitoring, what other problems do you think can be solved by the proposed system?

3. How do you think the automated system will benefit DOST personnel managing the refunds?

4. Since the proposed system will have an interface for the clients, how do you think this feature can benefit the clients?

APPENDIX C

Project Work Breakdown Structure (WBS)

STAGE 1. SYSTEM PLANNING

- 1.1 Define Project Goals
- 1.2 Identify Stakeholders
- 1.3 Develop Project Roadmap

STAGE 2. REQUIREMENT ANALYSIS

- 2.1 Gather Requirements
- 2.2 Prioritize Requirements
- 2.3 Validate Requirements

STAGE 3. DESIGN

- 3.1 Architectural Design
- 3.2 UI/UX Design
- 3.3 Detailed Component Design

STAGE 4. CODING

- 4.1 Setup development environment
- 4.2 Implement Features
- 4.3 Conduct Code Reviews

STAGE 5. TESTING

- 5.1 Unit Testing
- 5.2 Integration Testing
- 5.3 User Acceptance Testing

STAGE 6. DEPLOYMENT

- 6.1 Prepare for Deployment
- 6.2 Deploy to Production Environment
- 6.3 Conduct Post-Deployment Testing

(Project Gantt Chart)

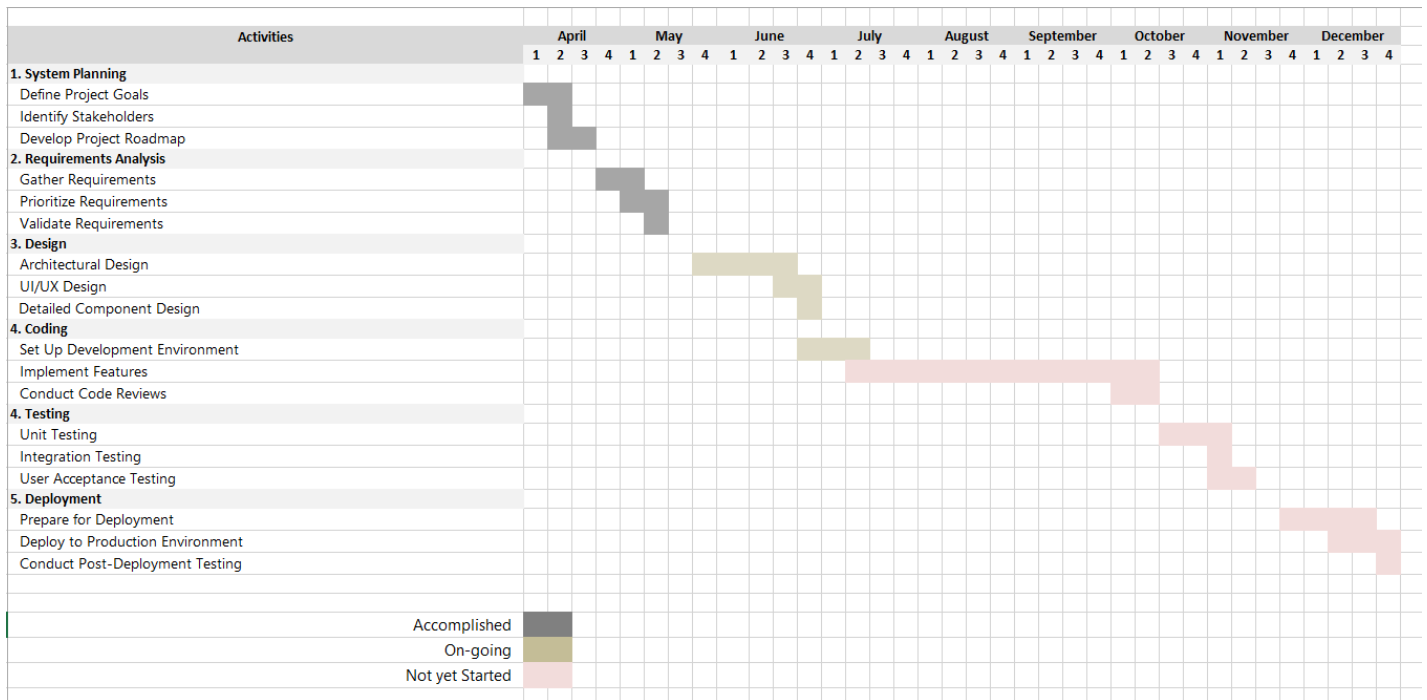


Figure 3: Gantt Chart

APPENDIX E

(SWOT Analysis- Operational Feasibility)

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Technical Expertise: DOST-PSTO Marinduque likely has access to technical experts who can oversee the implementation of the Refund Monitoring System. 2. Government Support: Being under DOST, there may be strong governmental support and resources available for the project. 3. Existing Infrastructure: The SETUP project has existing infrastructure like workstations, existing databases and human resources that can be optimized for the implementation of the new system. 4. Experience with SETUP Projects: Established procedures and experience in managing SETUP projects, providing a solid foundation for integrating a new system. 5. Data Availability: Existing financial records and databases that can be used to populate and validate the new system. 	<ol style="list-style-type: none"> 1. Limited Client Involvement: Limited involvement of clients in the planning and implementation phases, leading to a system that does not fully meet their needs.
Opportunities	Threats
<ol style="list-style-type: none"> 1. Improved Efficiency: The system can potentially streamline refund monitoring processes, leading to faster processing times. 2. Enhanced Transparency: Increased transparency in refund monitoring can improve stakeholder trust and accountability. 3. Scalability: Opportunity to scale the system to other projects or regions within DOST-PSTO. 4. Partnerships: Collaboration opportunities with tech firms or educational institutions for system development and support. 	<ol style="list-style-type: none"> 1. Technical Failures: Potential technical issues or system failures that could disrupt operations and require additional resources to resolve. 2. System Downtime: Potential for significant system downtime during implementation or operation, which could disrupt project workflows and financial monitoring.

APPENDIX F
(Screenshots of the System Prototype)

For admin:

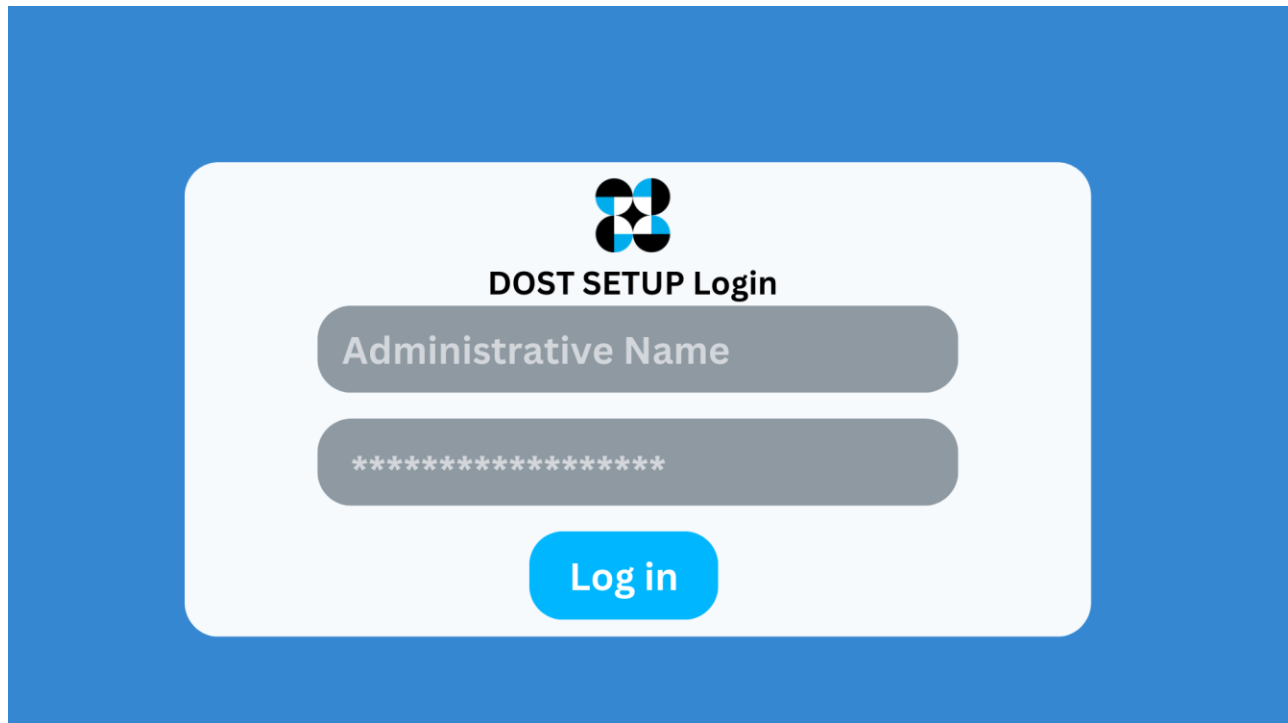


Figure 4: Admin login

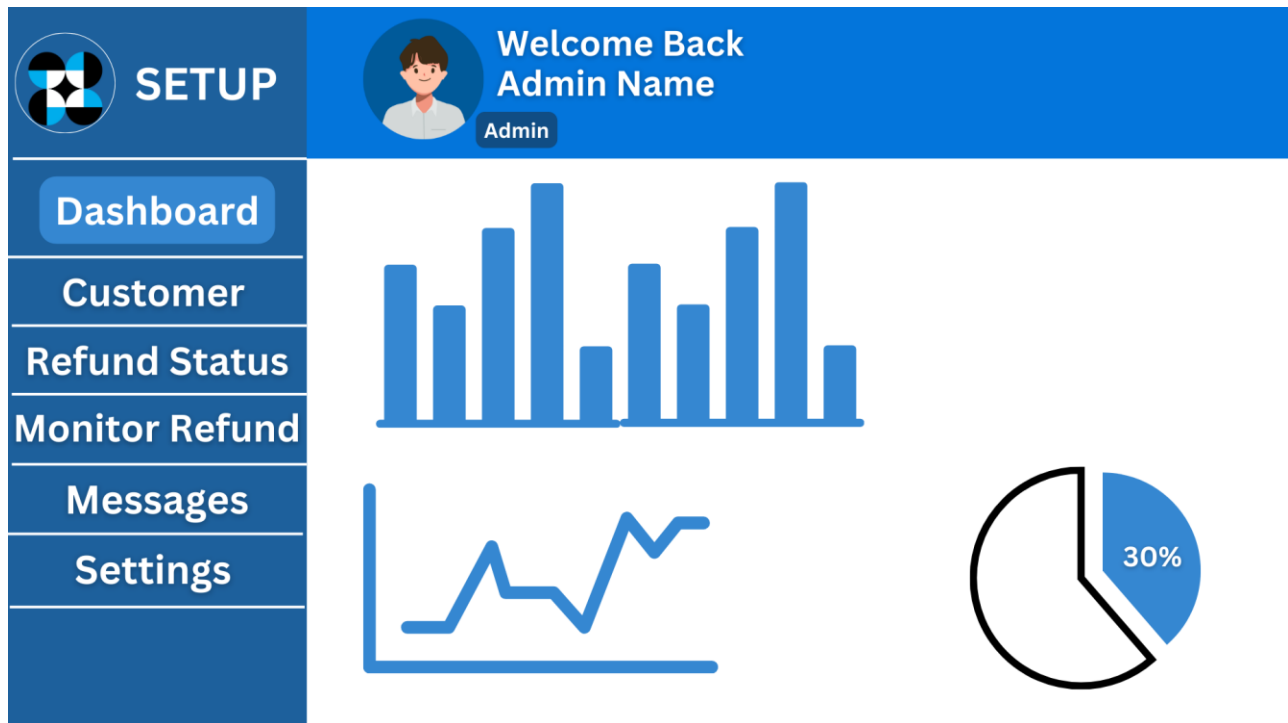



Figure 5: Admin dashboard

 **SETUP**

Dashboard



Customer

Refund Schedule

Monitor Refund


Messages

Settings

Firm Name	Refund Status	Refund Rate	
Diana Bakery	On-Time	30%	 

30%

Figure 6: List of clients and status

 **SETUP**

Dashboard

Customer

Refund Schedule

Monitor Refund

Messages

Settings

New Customer



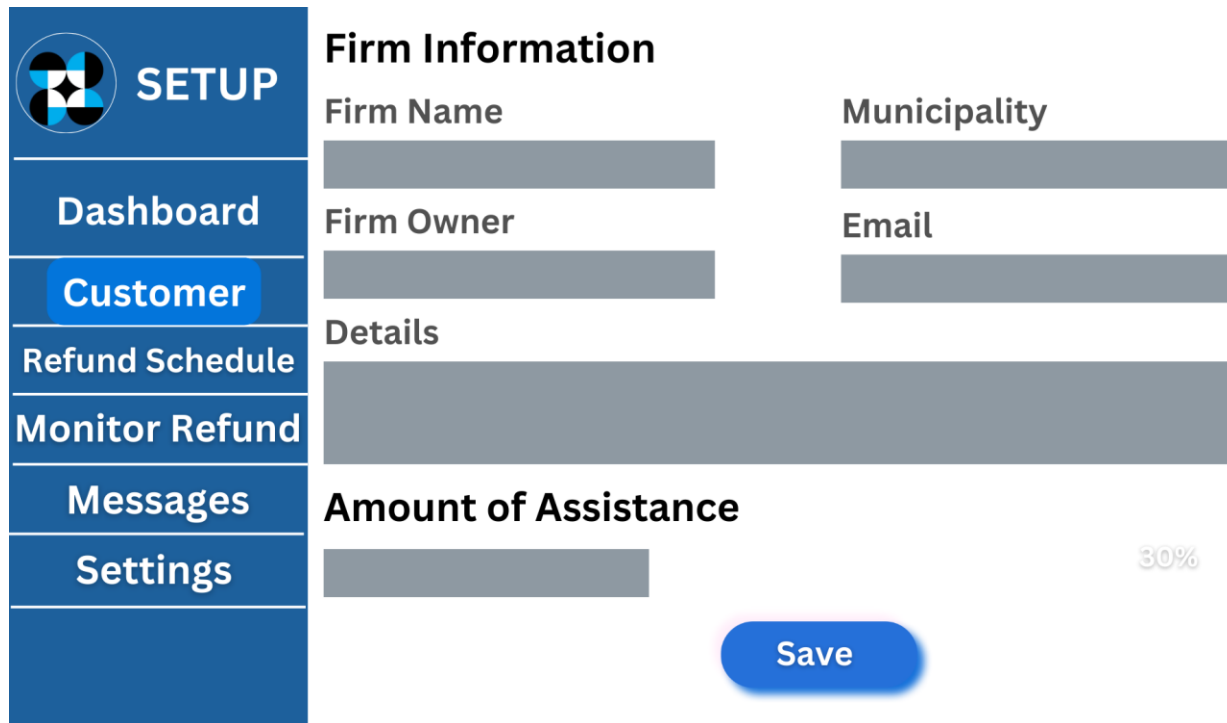

Firm Name
Diana Bakery  

Figure 7: Adding new customer/firm




SETUP

Dashboard
Customer
Refund Schedule
Monitor Refund
Messages
Settings

Firm Information

Firm Name

Municipality

Firm Owner

Email

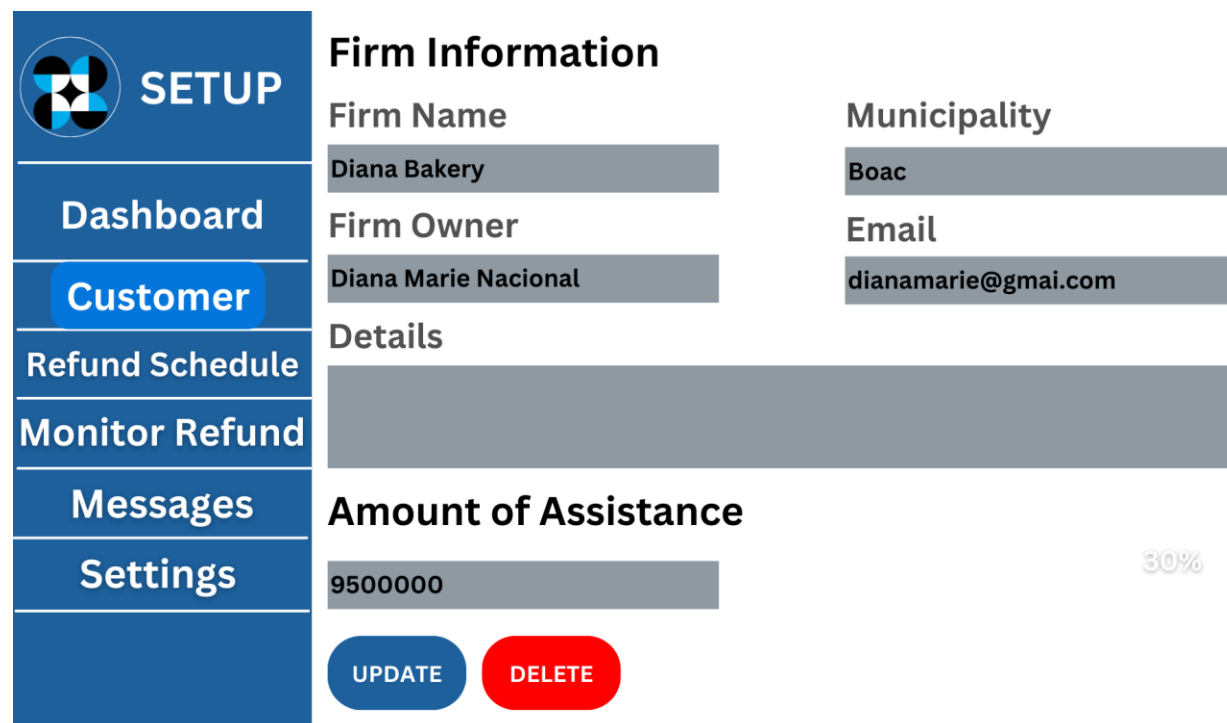
Details


Amount of Assistance

30%

Save

Figure 8: Field for AddingNew Customer/Firm




SETUP

Dashboard
Customer
Refund Schedule
Monitor Refund
Messages
Settings

Firm Information

Firm Name

Diana Bakery

Municipality

Boac

Firm Owner

Diana Marie Nacional

Email

dianamarie@gmail.com

Details

Amount of Assistance

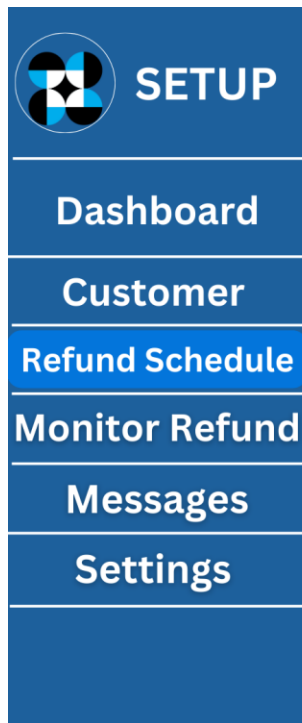
9500000

30%

UPDATE

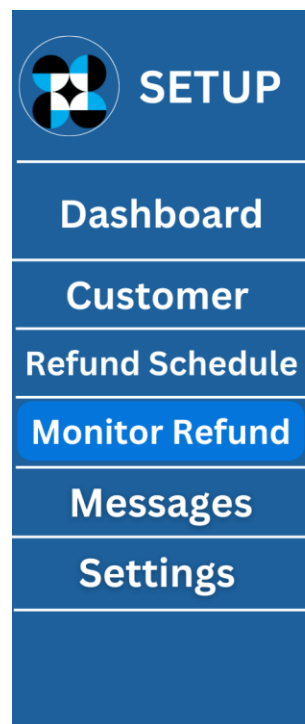
DELETE


Figure 9: Example input for Adding New Customer/Firm




June						
Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13 <small>Customer 2</small>	14	15 <small>Customer 1</small>
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

Figure 10: Refund Schedule






January			
	FIRM NAME	REFUND STATUS	REFUND RATE
1	Diana Bakery	On-Time	30% 
2			
3			
4			

< 1 2 3 .. >

Figure 11: Monitor Refund



SETUP

Dashboard

Customer

Refund Schedule

Monitor Refund

Messages

Settings

Diana Bakery

Assistance Details

Amount of Assistance

9500000

Total Refund Payment

263888

Monthly Refund

Monthly Due

263888

Refund Payment

263888

☐ For Restructuring

Arrears

0

Refund Rate


3%

Refund Status

On-Time

Submit

Figure 12: Monitoring Individual Refund



SETUP

Dashboard

Customer

Refund Schedule

Monitor Refund

Messages

Settings

Customers

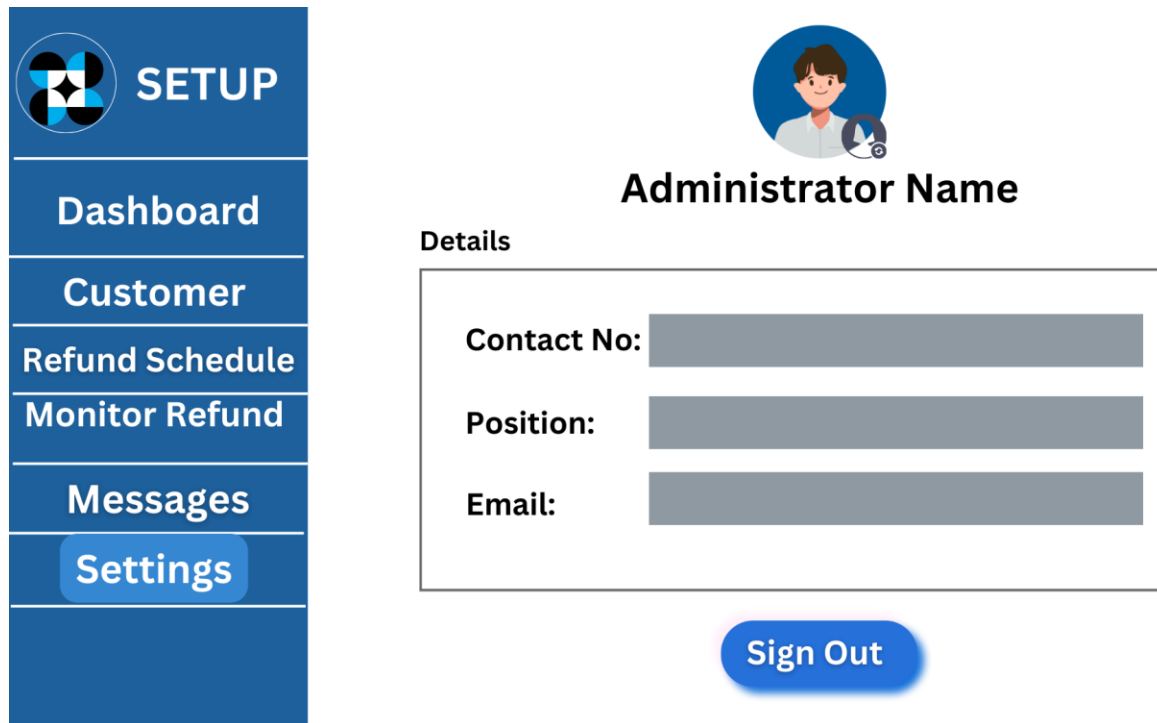
Customer 1

Customer 2

Customer 3

Customer 1

Figure 13: Message Interface for Admin



The image shows the 'Settings' interface for an administrator. On the left is a dark blue sidebar with a 'SETUP' logo at the top. Below the logo are menu items: 'Dashboard', 'Customer', 'Refund Schedule', 'Monitor Refund', 'Messages', and 'Settings' (which is highlighted with a lighter blue background). The main content area has a white background. At the top center is a circular profile picture of a man. Below it is the text 'Administrator Name'. Underneath is a section titled 'Details' containing three input fields: 'Contact No:', 'Position:', and 'Email:'. At the bottom center of the main area is a blue rounded button labeled 'Sign Out'.

SETUP

Dashboard

Customer

Refund Schedule

Monitor Refund

Messages

Settings

Administrator Name

Details

Contact No:

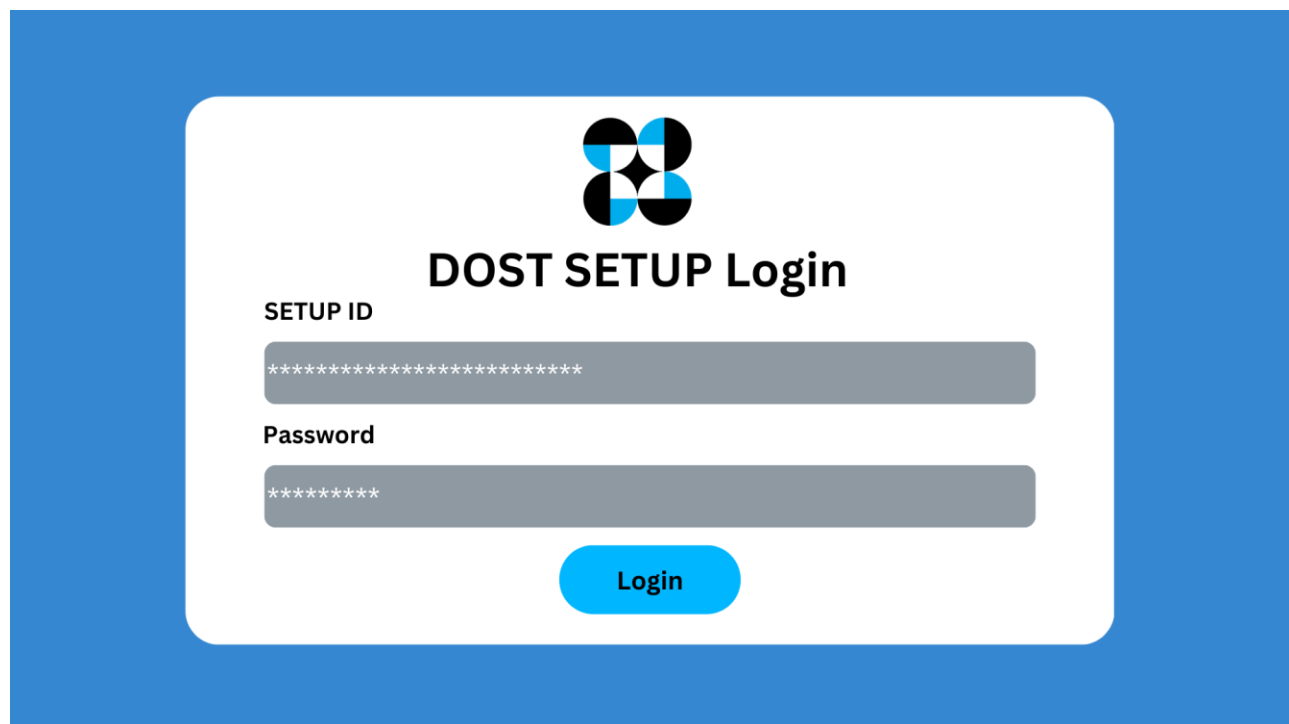
Position:

Email:

Sign Out

Figure 14: Setting interface for Admin

For customer:



The image shows the 'DOST SETUP Login' interface for a customer. It features a blue background with a white rounded rectangle in the center. At the top of the white area is a logo consisting of four overlapping circles in black and blue. Below the logo is the text 'DOST SETUP Login'. Underneath are two input fields: 'SETUP ID' and 'Password', both containing masked text (asterisks). At the bottom center of the white area is a blue rounded button labeled 'Login'.

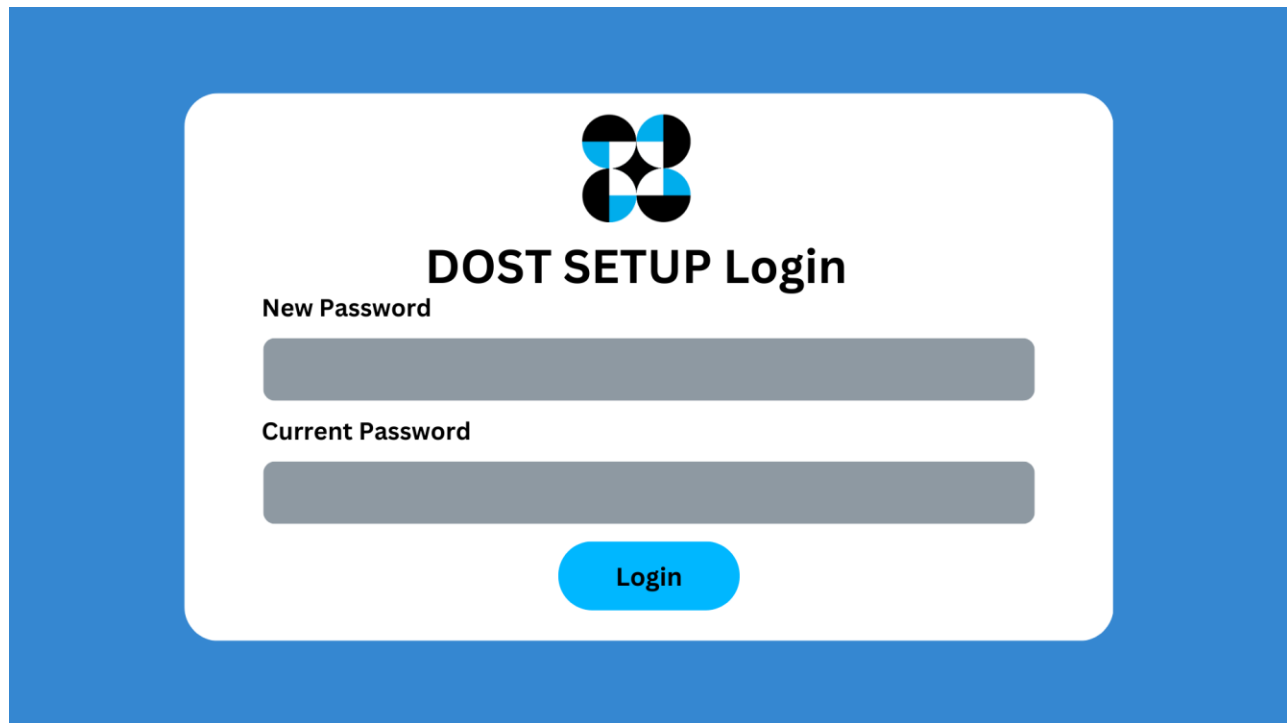
DOST SETUP Login

SETUP ID


Password

Login

Figure 15: Customer login



The login form is centered on a blue background. It features a logo at the top consisting of four overlapping circles in black and blue. Below the logo, the text "DOST SETUP Login" is displayed in a bold, black font. Underneath, there are two input fields: the first is labeled "New Password" and the second is labeled "Current Password". Both fields are represented by gray rectangular bars. At the bottom of the form is a blue button with the word "Login" in white text.



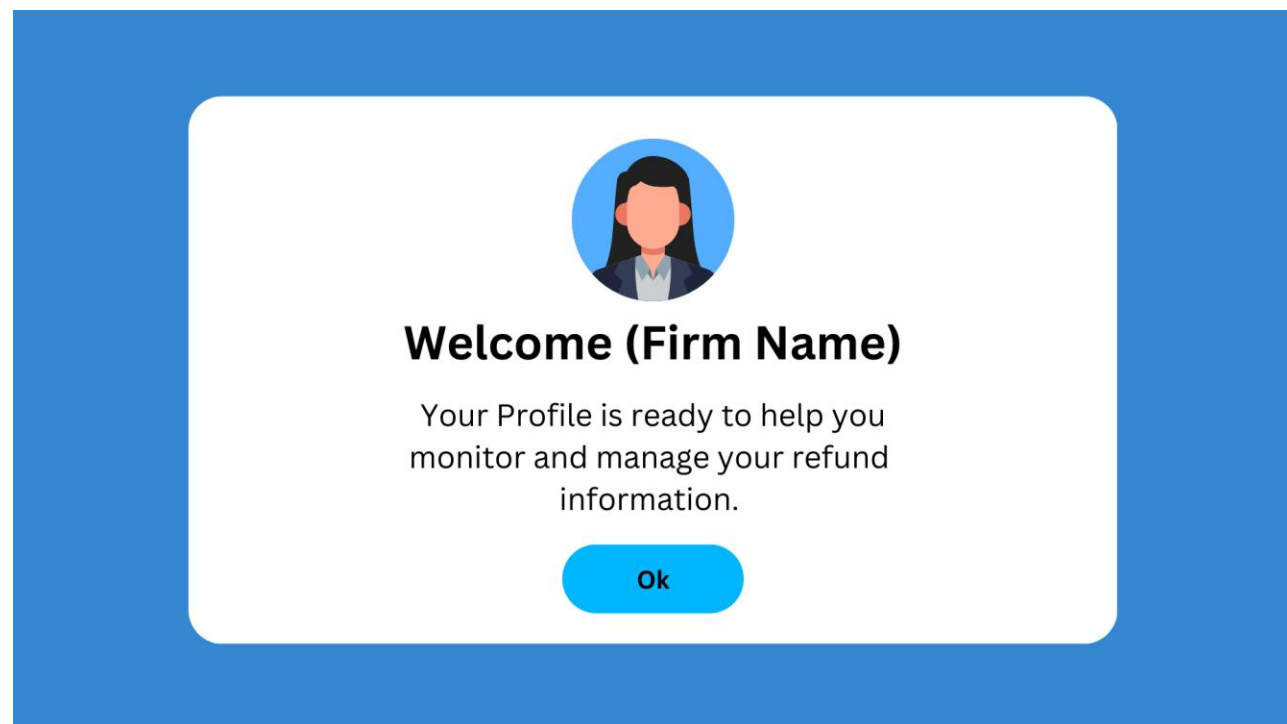
DOST SETUP Login

New Password


Current Password

Login

Figure 16: Login form



The welcome screen is centered on a blue background. It features a circular profile picture of a woman with long dark hair. Below the profile picture, the text "Welcome (Firm Name)" is displayed in a bold, black font. Underneath, there is a paragraph of text: "Your Profile is ready to help you monitor and manage your refund information." At the bottom of the screen is a blue button with the word "Ok" in white text.



Welcome (Firm Name)

Your Profile is ready to help you monitor and manage your refund information.

Ok

Figure 17: Verify Account

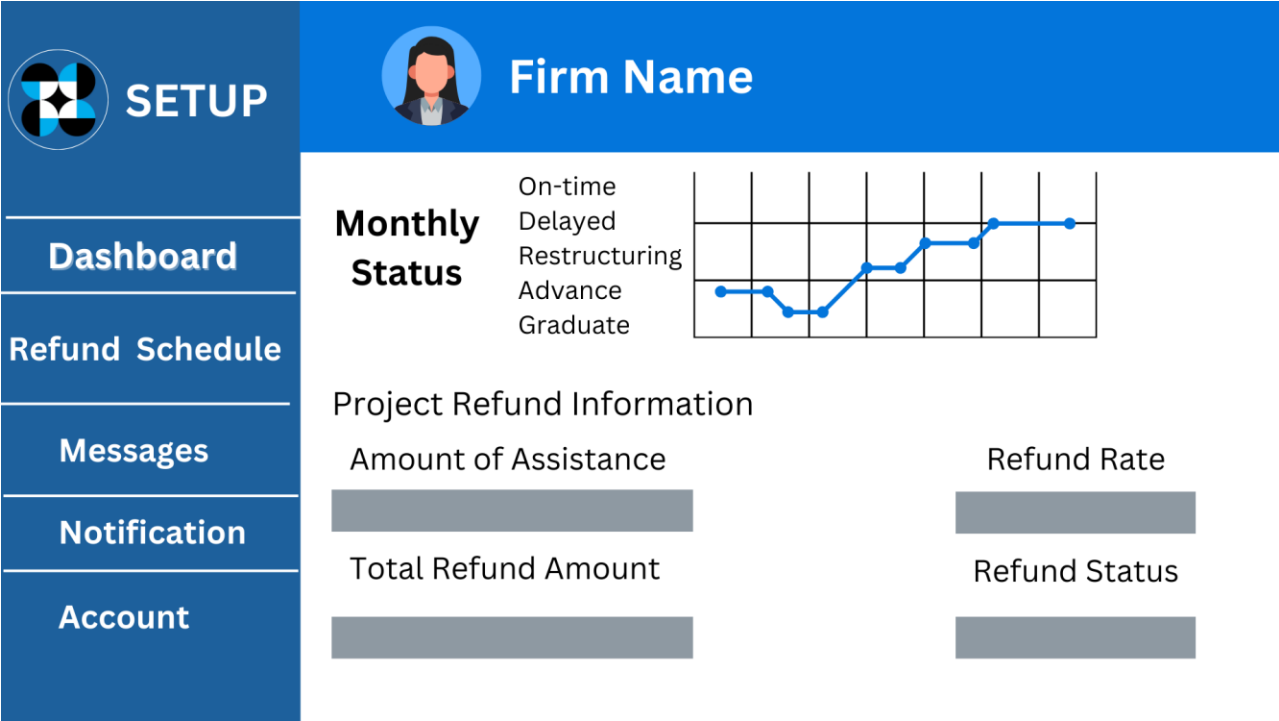


Figure 18: Customer Dashboard

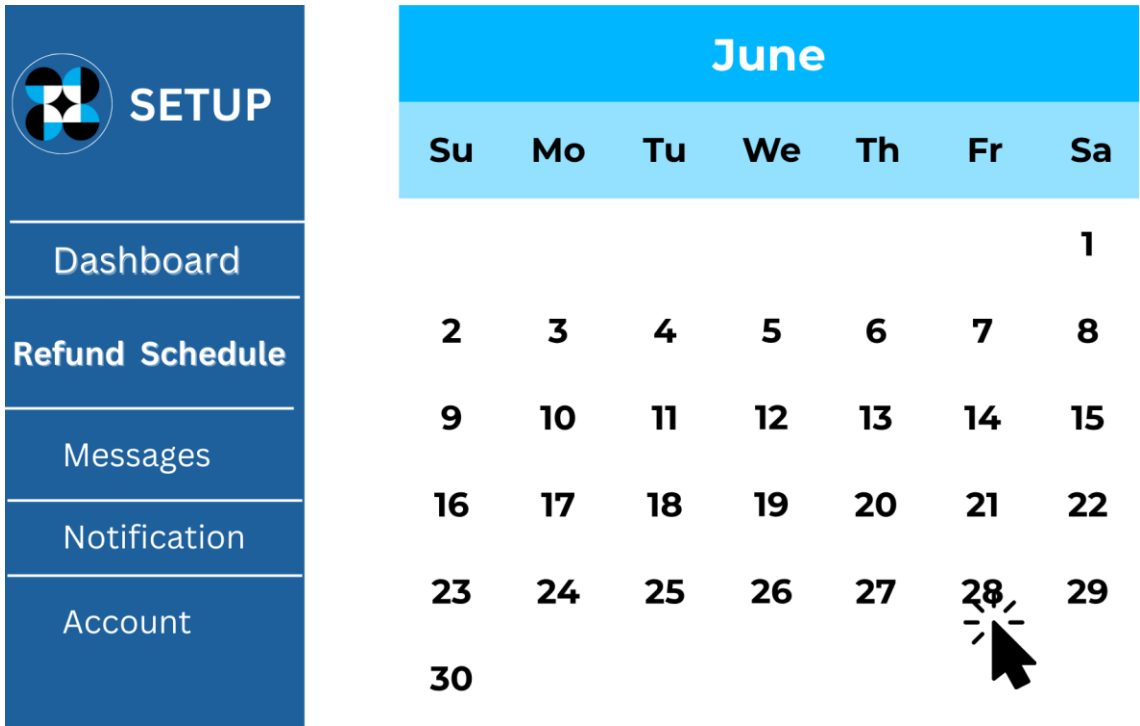



Figure 19: Refund Schedule for client

 **SETUP**

Dashboard

Refund Schedule

Messages

Notification

Account

Set Refund Schedule


Add Title

Refund Details

Time

Schedule

Figure 20: Setting Refund Schedule

 **SETUP**


Dashboard


Refund Schedule


Messages

Notification

Account







@ Type Message...

Figure 21: Message interface for customer

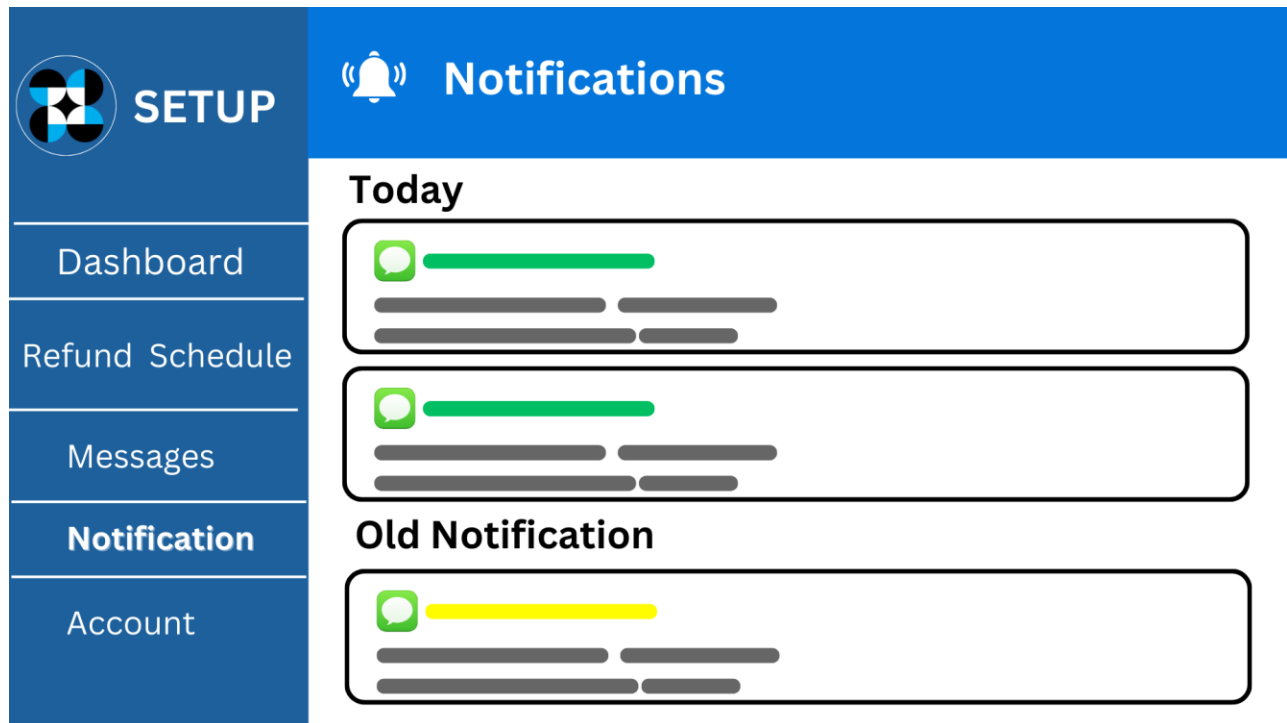


Figure 22: Notification interface for customer

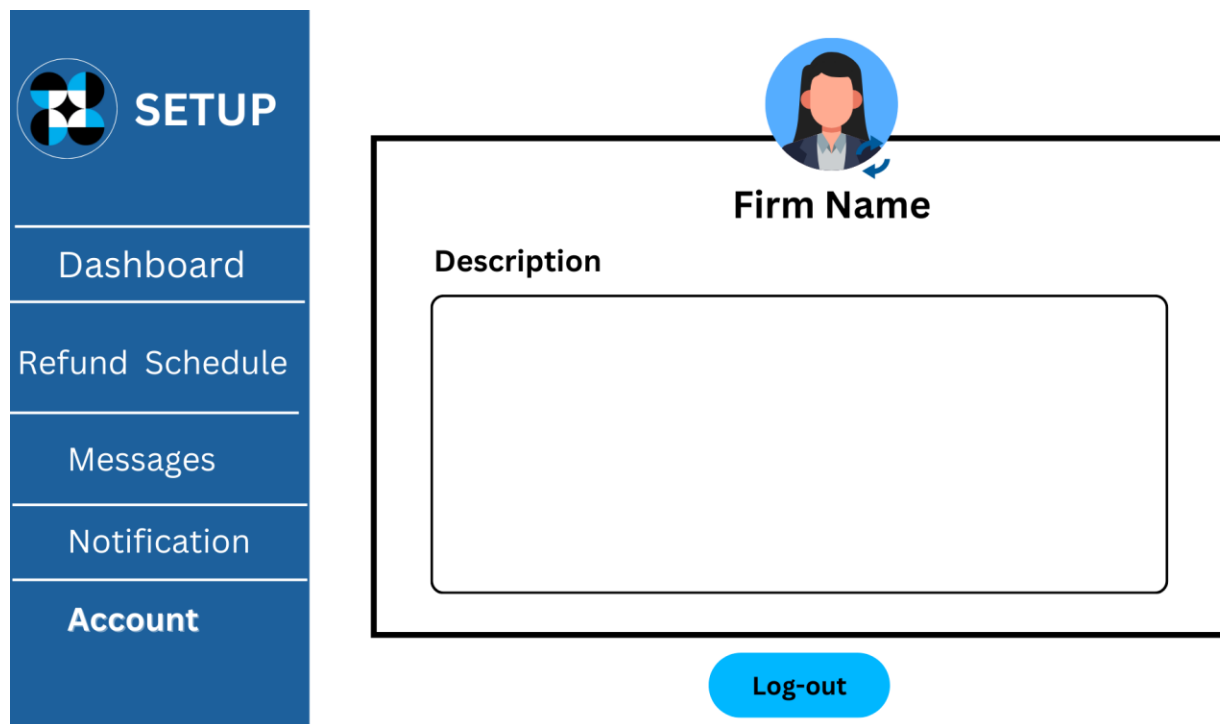


Figure 23: Account interface

APPENDIX G

Technical Feasibility: GAP Analysis of Hardware and Software

	Existing System	Proposed System	Action Taken
Hardware Requirement	Processor: Intel(R) Pentium(R) Silver N6000 @ 1.10GHz 1.11 GHz	Processor: Intel(R) Pentium(R) Silver N6000 @ 1.10GHz 1.11 GHz	No action needed
	Motherboard: Integrated with Intel® chipset	Motherboard: Integrated with Intel® chipset	No action needed
	RAM: Up to 4GB DDR4 on board	RAM: Up to 8GB DDR4 on board	The organization need to upgrade their RAM to 8GB or higher
	Hard Disk Drive: 500	Hard Disk Drive: 1TB	The organization need to upgrade Hard Disk Drive to 1TB
	Bandwidth: 100 mbps	Bandwidth: 100 mbps	No action needed
	Operating System: Windows 10	Operating System: Windows 10	No action needed
Software Requirement	Front End: Excel	Front End: Html, PHP	No action needed
	Documentation: Microsoft Word/Excel	Documentation: Microsoft Word	No action needed
	Scripting Language: 	Scripting Language: Java Script	No action needed
	Backend: 	Backend: MySQL	The organization need to install XAMPP Control Panel

APPENDIX H
(Economic Feasibility)

Cost-Benefit Analysis

Development and Installation Estimation Cost

Particulars	Amount	Annual Cost
Domain Name	P1,050.00	P1,050.00
Web- Hosting	P1,000.00	P1,000.00
Developers Allowance	P10,000.00	P10,000.00
Supplies used during development	P1,490.00	P1,490.00
TOTAL COST	P13,540.00	P13,540.00

Operational Cost Estimation of the Proposed System

SUPPLIES AND MATERIALS	Monthly Cost	Annual Cost
Hardware	P2,500.00	P30,000.00
Software	P5,000.00	P60,000.00
Personnel Costs	P5,000.00	P60,000.00
Maintenance Costs	P3,000.00	P36,000.00
Miscellaneous Costs	P1,000.00	P12,000.00
TOTAL COST	P16,500.00	P198,000.00

Operational Cost Estimation of the Existing System

SUPPLIES AND MATERIALS	Monthly Cost	Annual Cost
Hardware	P5,000.00	P60,000.00
Software	P5,000.00	P60,000.00
Internet	P1,500.00	P18,000.00
Office Supplies(paper, pens, etc.)	P2,500.00	P30,000.00
Miscellaneous Cost (Travel-For any on-site visits or follow-ups with program participants.)	P5,000.00	P60,000.00
TOTAL COST	P 19,000.00	P228,000.00

Note: Values are estimated.

Cost Benefit Analysis

To compute the Projected Benefit, simply subtract the operational cost of the existing system to the operational cost of the proposed system.

Description	Year 0	Year 1	Year 2	Year 3
Operational Cost of Existing System		P228,000.00	P228,000.00	P228,000.00
Development/ Installation Cost	- P13,540.00			
Operational Cost of Proposed		P198,000.00	P198,000.00	P198,000.00
Project Benefit	- P13,540.00	30,000.00	30,000.00	30,000.00

To compute the Cumulative Benefit, simply add the Cumulative Benefit Year 0 to Projected Benefit Year 1, Cumulative Benefit Year 1 to Projected Benefit Year 2, so on...

Description	Year 0	Year 1	Year 2	Year 3
Operational Cost of Existing System		P228,000.00	P228,000.00	P228,000.00
Development/ Installation Cost	-P13,540.00			
Operational Cost of Proposed		P198,000.00	P198,000.00	P198,000.00
Project Benefit	-P13,540.00	30,000.00	30,000.00	30,000.00
Cumulative Benefit	-P13,540.00	P16,460.00	P46,460.00	P76,460.00

APPENDIX I

(Design of the Existing System - Data Flow Diagram)

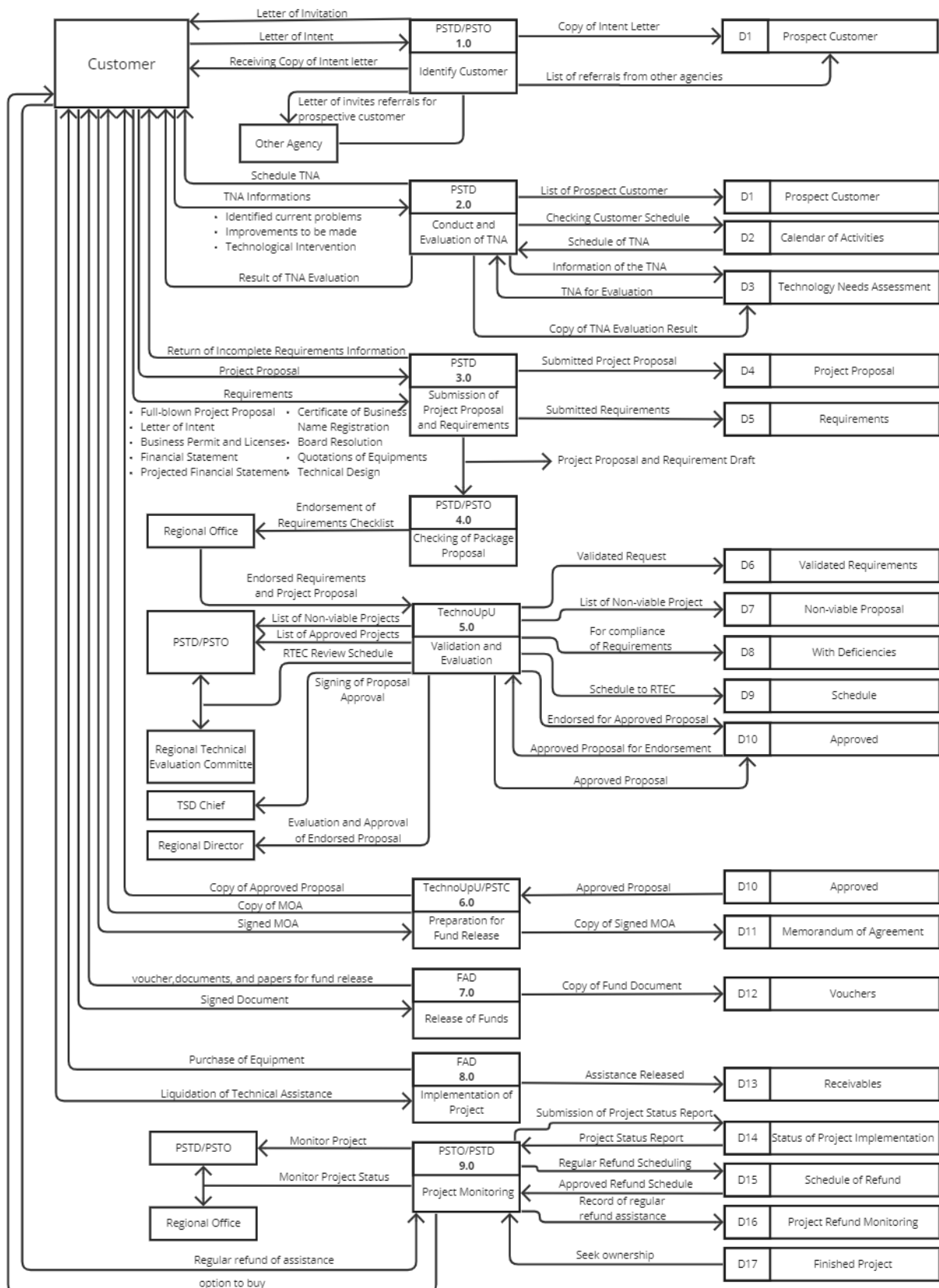


Figure 24: Data Flow Diagram

APPENDIX J
(Design of the Proposed System - Use-Case Diagram)

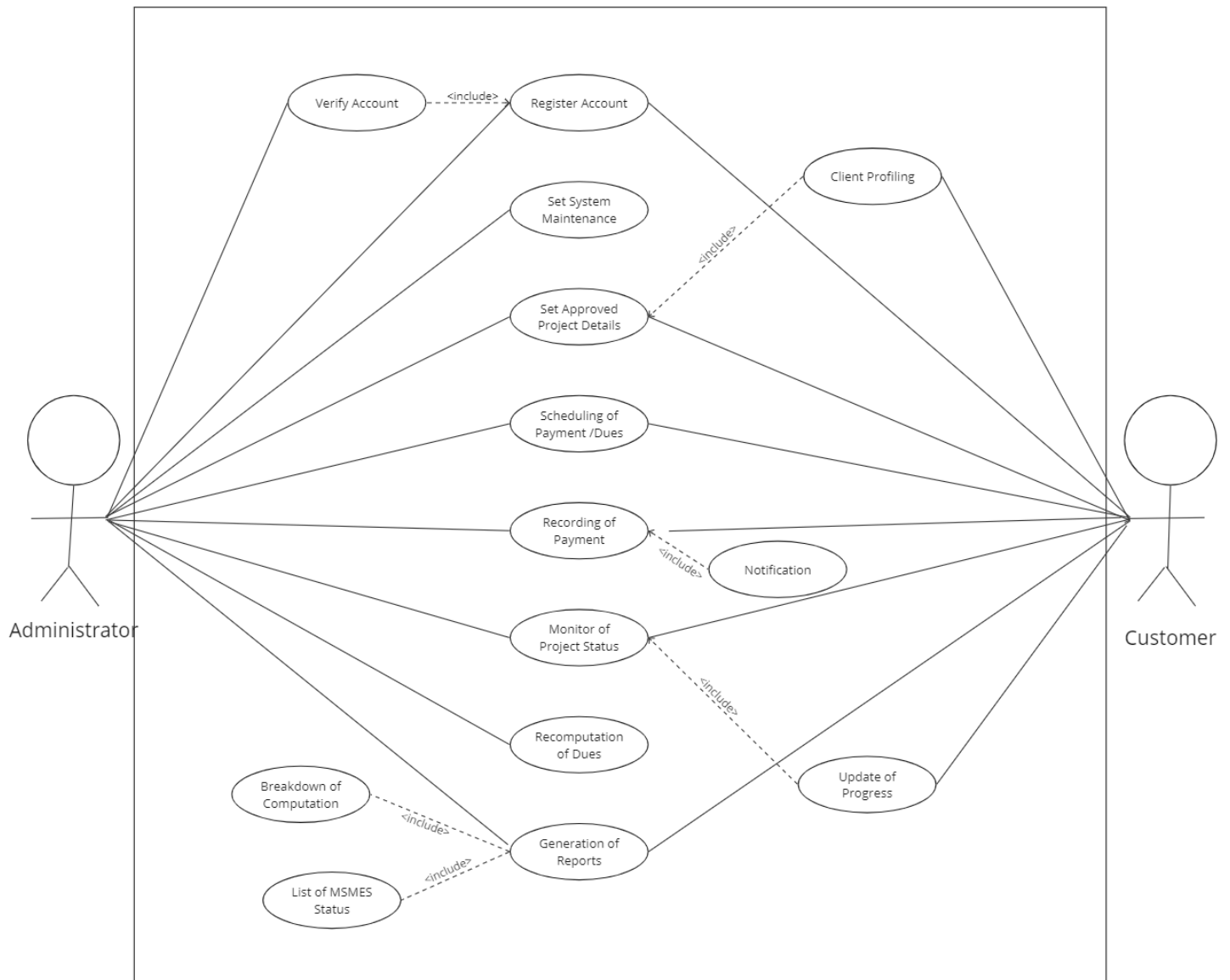


Figure 25: Use-Case Diagram

APPENDIX K
(User Case Story of the Developed System)

1. Use Case Title: Register Account

Description: The admin will login their account by providing their data and the system will verify their details.

Primary actor: Administrator

Goal: To access the primary function of the system

Pre-Conditions: The admin must provide his email and password.

Post-Conditions: The admin has successfully logged in to his account.

Table 1. Use Case Scenario of Creating Account

Actor	System
1. Access the system 3. Enter “username” and “password”	2. Display a login form 4. Verify the data and confirm if the entered details are valid. 5. Verify Account 6. Redirect to the admin interface.

2. Use Case Title: Set System Maintenance

Description: The admin will see the dashboard and navigation bar that is needed in the system.

Primary Actor: Administrator

Goal: The admin can see the dashboard and buttons on the navigation bar to have a full control on the system.

Pre-Conditions: The admin has a valid reason for adding/editing the content of the dashboard.

Post-Conditions: The admin can see the dashboard and navigation bar and use it for adding and editing new clients.

Table 2. Use Case Scenario of Verifying an Account

Actor	System
1. Login to the system 3. Click navigation bar	2. Display the admin dashboard 4. Display of System Maintenances

3. Use Case Title: Set Approved Project Details

Description: The admin will add new customers based on the approved project details.

Primary actor: Administrator

Goal: The admin can add new customers to the list of firms/businesses for refund monitoring.

Pre-conditions: The admin must ensure that the firm is included in the list of approved refunded projects before adding them to the list of firms/businesses for refund monitoring.

Post-conditions: The admin has successfully added a new firm to the system.

Table 3: Use Case Scenario of Setting Approved Project Details

Actor	System
1. Login to the system 3. Click “Customers” 5. Fill the field with the desired customer type	2. Display the admin dashboard 4. Display field to fill up new customer 6. Display an updated list with added customer in System Maintenance

4. Use Case Title: Client Profiling

Description: The customer will access the client profile.

Primary actor: Customer

Goal: The customer can access the client profile provided by the admin.

Pre-conditions: The customer must be logged into the system. The profile must have been created and authorized by an admin.

Post-conditions: The customer successfully accesses and views the client profile.

Table 4: Use Case Scenario of Client Profiling

Actor	System
1. Access the system 3. Fill out the required fields and click “Log in” 6. View the client profile	2. Display a login form 4. Verify the data and confirm if the entered details are valid. 5. Redirect to the client dashboard

5. Use Case Title: Scheduling Of Payment/Dues

Description: The admin will set up, modify, and track scheduled payments of the refund of the customer.

Primary actor: Administrator

Goal: The admin can set up, modify, and track scheduled payments of the refund of the customer.

Pre-conditions: The user must be an administrator.

Post-Conditions: The user has successfully scheduled payment of refund.

Table 5: Use Case Scenario of Scheduling of Payment/Dues

Actor	System
1. Login to the system 3. Click “Refund Schedule” on the navigation bar 5. Set up schedule of payment	2. Display the admin dashboard 4. Display google calendar 6. Display new schedule of payment for monthly refund

6. Use Case Title: Recording of Payment

Description: The admin will record the payment of refund of the customer.

Primary actor: Administrator

Goal: The admin can record the payment of refund of the customer.

Pre-conditions: The payment details must be available (e.g., payment amount and payment date)

Post-Conditions: The payment is recorded in the system.

Table 6: Use Case Scenario of Recording of Payment

Actor	System
1. Login to the system 3. Click “Customer” 5. Click “Edit” on one of the firms 7. Record the refund payment	2. Display the admin dashboard 4. Display the list of firms 6. Display field to record payment of the firm 8. Display the updated record of the refund payment

7. Use Case Title: Notification

Description: The client will receive notifications containing their record of payment.

Primary actor: Customer

Goal: The client can receive timely notifications containing their record of payment.

Pre-conditions: The system must have a record of the customer's payment details.

Post-conditions: The customer successfully receives the notification.

Table 7: Use Case Scenario of Notification

Actor	System
1. Login to the system 3. Click “Notifications” 5. View the notification	2. Display the client dashboard 4. Display the notification containing the record of their payment.

8. Use Case Title: Monitoring of Project Status

Description: The admin will monitor the project status of each firm that was updated to be displayed on the dashboard.

Primary actor: administrator

Goal: The admin can view and monitor the project status of each firm.

Pre-conditions: The project statuses of each firm must be updated and available in the system for monitoring.

Post-Conditions: The project statuses of each firm are correctly displayed on the dashboard for the administrator to view.

Table 8: Use Case Scenario of Monitoring of Project Status

Actor	System
1. Login to the system 3. Click “Customer” in the navigation bar 5. Click “Edit” 7. Fill the field with the updated progress of firm’s refund status.	2. Display the admin dashboard. 4. Display the refund status classified as monthly and cumulative. 6. Display field to edit the project refund status classified as ‘On-time’, ‘Delayed’, ‘Restructuring’, ‘advanced’, ‘Terminated’ and ‘Graduated’ 8. Display the updated project status

9. Use Case Title: Update of Progress

Description: The client will view the updated progress of their refund.

Primary actor: Customer

Goal: The client can view the updated progress of their refund.

Pre-conditions: Updated refund progress data must be available in the system.

Post-conditions: The customer can view the current status and details of their refund progress.

Table 9: Use Case Scenario of Update of progress

Actor	System
1. Login to the system 3. View the updated progress of refund	2. Display the client dashboard

10. Use Case Title: Recomputation of Dues

Description: The admin will recompute the payment/dues of the customer based on the updated project status.

Primary actor: Administrator

Goal: The admin can recompute the payment/dues of the customer's refund.

Pre-conditions: The system has a functional recomputation module that can calculate dues based on the updated project status.

Post-Conditions: The customer's payment/dues information is updated in the system based on the recomputation.

Table 10: Use Case Scenario of Recomputation of Dues

Actor	System
1. Login to the system 3. Click "Customer" 5. Click "Monthly Payment" and update the progress 8. Reviews the recomputed dues and confirms the changes.	2. Display the dashboard 4. Display the refund status classified as monthly and cumulative 6. Retrieves the necessary data, including initial payments, current dues, and project status 7. Calculates the new dues based on the updated project status 9. Updates the customer's records with the recomputed dues

11. Use Case Title: Generation of Reports

Description: The admin will generate reports containing the breakdown of computation and list of customer status.

Primary actor: Administrator

Goal: The admin can generate reports containing the breakdown of computation and list of customer refund status.

Pre-conditions: The system has up-to-date customer data, including their statuses and refund information.

Post-Conditions: The admin has successfully generated reports containing accurate and complete data, including the breakdown of computation and the list of customer refund statuses.

Table 11: Use Case Scenario of Generation of Reports

Actor	System
1. Login to the system 3. View the breakdown of computation and list of customer status	2. Display the admin dashboard